

WHAT IS CLAIMED IS:

1. A dioptric projection objective for forming an image of an object, comprising:
a plurality of lenses arranged in an optical path between the object and the image;
at least two lenses of the plurality of lenses having respective mutually adjacent lens surfaces which are aspheric to define a double asphere; and
the plurality of lenses comprising positive lens groups each having at least two lenses, and negative lens groups each having at least two lenses.
2. The dioptric projection objective according to claim 1, wherein at least one negative lens group of the negative lens groups consists of two negative lenses.
3. The dioptric projection objective according to claim 1, wherein one positive lens group of the positive lens groups comprises an aperture stop.
4. The dioptric projection objective according to claim 1, wherein the plurality of lenses comprises a first lens group with a positive power, a second lens group with a negative power, a third lens group with a positive power, a fourth lens group with a negative power, and a fifth lens group with a positive power.
5. The dioptric projection objective according to claim 4, wherein the second lens group consists of two negative lenses.
6. The dioptric projection objective according to claim 4, wherein the fourth lens group comprises two negative lenses.
7. The dioptric projection objective according to claim 1, wherein all aspherical lens surfaces of the objective are formed on different lenses.
8. The dioptric projection objective according to claim 1, wherein each of the aspherical lens surfaces of the double asphere has a symmetrical shape about an optical axis of the objective.
9. A dioptric projection objective having an image side numerical aperture that is greater than or equal to 0.75 for forming an image of an object, comprising:
a plurality of lenses arranged in an optical path between the object and the image;
at least two of the lenses of the plurality of lenses having respective mutually proximal lens surfaces which are aspheric to define a double asphere.
10. The dioptric projection objective according to claim 9, wherein the plurality of lenses comprises at least two negative lens groups, a positive lens group in an optical path

between the two negative lens groups, and another positive lens group having an aperture stop.

11. The dioptric projection objective according to claim 10, wherein at least one negative lens group of the negative lens groups consists of two negative lenses.

12. The dioptric projection objective according to claim 11, wherein at least one negative lens group of the negative lens groups comprises two negative lenses.

13. The dioptric projection objective according to claim 9, wherein each of the aspherical lens surfaces of the double asphere has a symmetrical shape about an optical axis of the objective.

14. A dioptric projection objective for forming an image of an object, comprising:
a plurality of lenses arranged in an optical path between the object and the image;

at least two of the lenses of the plurality of lenses having respective mutually juxtaposed lens surfaces which are aspheric to define a double asphere; and

the plurality of lenses comprising at least two negative lens groups, a positive lens group in an optical path between the two negative lens groups, and another positive lens group having an aperture stop.

15. The dioptric projection objective according to claim 14, wherein at least one negative lens group of the negative lens groups comprises two negative lenses.

16. The dioptric projection objective according to claim 15, wherein at least one negative lens group of the negative lens groups consists of two negative lenses.

17. The dioptric projection objective according to claim 14, wherein each of the aspherical lens surfaces of the double asphere has a symmetrical shape about an optical axis of the objective.

18. An exposure apparatus comprising:
an illumination system which is arranged in an optical path between a light source and a mask and which illuminates the mask based on a light supplied from the light source; and

the projection objective according to claim 1, that forms an image of a pattern on the mask onto a photosensitive substrate.

19. An exposure method, comprising:
illuminating a mask; and
exposing via the projection objective according to claim 1, an image of a pattern on the mask onto a photosensitive substrate.

20. An exposure apparatus comprising:
an illumination system which is arranged in an optical path between a light source and a mask and which illuminates the mask based on a light supplied from the light source; and
the projection objective according to claim 9, that forms an image of a pattern on the mask onto a photosensitive substrate.
21. An exposure method, comprising:
illuminating a mask; and
exposing via the projection objective according to claim 9, an image of a pattern on the mask onto a photosensitive substrate.
22. An exposure apparatus comprising:
an illumination system which is arranged in an optical path between a light source and a mask and which illuminates the mask based on a light supplied from the light source; and
the projection objective according to claim 14, that forms an image of a pattern on the mask onto a photosensitive substrate.
23. An exposure method, comprising:
illuminating a mask; and
exposing via the projection objective according to claim 14, an image of a pattern on the mask onto a photosensitive substrate.